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COMMISSION ON PLANT GENETIC RESOURCES

Sixth Session

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REPORTS, PROGRAMMES AND ACTIVITIES ON PLANT GENETIC RESOURCES: 1. REPORT ON FAO'S ACTIVITIES

REPORTS, PROGRAMMES AND ACTIVITIES ON PLANT GENETIC RESOURCES: 1. REPORT ON FAO'S ACTIVITIES

I. INTRODUCTION

1. The Commission on Plant Genetic Resources is the only inter-governmental body where member countries, both donors of funds and technology and users of germplasm, discuss matters specifically related to plant genetic resources for food and agriculture. The Commission, as provided for in its mandate, has regularly received reports on FAO's policies, programmes and activities for the conservation and use of plant genetic resources. It had also received reports from other inter-governmental organizations, the International Board for Plant Genetic Resources (IBPGR, now the International Plant Genetic Resources Institute, IPGRI), other International Agricultural Research Centres of the Consultative Group on International Agricultural Research, and other non-governmental organizations. The Commission considers such reports to be of value, both to the Commission and to the organizations, which are thereby able to better acquaint countries with their objectives and programmes, and benefit from their comments.

2. This document reports on FAO's own activities. The companion document, CPGR-6/95/5.1, contains the reports submitted by inter-governmental and international non-governmental organizations to this session of the Commission.

3. In reviewing the report on FAO's Activities and Programmes at its Fifth Session, the Commission "requested more detailed information on FAO's programmes and activities, including human and financial resources allocations relevant to the Commission's interest in conservation, training, seed activities, etc.". The Ninth Session of the Working Group also requested that FAO provide the Commissions's Sixth Session with "detailed information on FAO programmes and projects on the conservation and utilization of plant genetic resources". Accordingly, the present report concentrates upon these subjects. In this document, the concept of "utilization" is in line with that used by the Commission, and the International Undertaking on Plant Genetic Resources, which includes, *inter alia*, "plant breeding" and "seed multiplication and distribution" (Articles 6 and 7).

II. FAO ACTIVITIES IN 1993 AND 1994, AND FUTURE PROGRAMME

4. FAO's activities on plant genetic resources for food and agriculture are mainly supported by the Agricultural Department, and, in particular, the Plant Production and Protection Division, for crop genetic resources; and by the Forestry Department, for the conservation of the genetic resources of forest plant species. The two department collaborate in regard to *in situ* conservation, particularly of wild crop relatives. The Legal Office provides substantial support to both programmes, and is itself responsible for a variety of activities related to the conservation and utilization of plant genetic resources. Other departments, such as the Economic and Social Policy Department, and the Sustainable Development Department, also contribute to the Organization's activities in this field. The present report does not, however, deal with their activities, though they will be covered in future reports.

5. Plant genetic resource activities take place both under the Regular Programme and with extrabudgetary resources in support of field projects.

1. Crop genetic resource activities

Regular programme activities

6. *Table 1* lists the budgetary allocations, within the 1993-94 Regular Programme budget of the Agriculture Department, in which substantial activities on crop genetic resources take place. These figures include the salaries of FAO staff involved in plant genetic resource activities. The Regular Programme acts as catalyser for, and provides support to, Field Programme Activities. In the case of each of these elements, an estimate is given of the degree of involvement in plant genetic resources activities. In addition to these elements, there is a budgetary allocation of US$ 1.4 million in the 1993/94 biennium to cover the servicing of the Commission and its Working Group.[1]

7. The Plant Production and Protection Division, under these budgetary allocations, provides operational support to a number of components of the FAO Global System on the Conservation and Utilization of Plant Genetic Resources.[2] This includes the provision of the Secretariat for, and the servicing of, the Commission and its Working Group.

8. *Ex Situ Conservation and Networking* supports the development of the Global System's International Network of *Ex Situ* Collections under the Auspices of FAO,[3] through the provision of advice and technical assistance, especially to developing countries, to upgrade conservation facilities and to strengthen institutional capacities. In 1995, with FAO participation, the CGIAR Centres (twelve of which formally joined the Network in October 1994), initiated an external assessment of their genebank operations, which will assist in the further development of their genebank facilities and operations, including arrangements for the safety duplication of accessions. FAO in 1995 initiated studies to develop a management structure for the Network and propose activities.

9. *In Situ Protected Areas and Networking* activities are undertaken in cooperation with the Forest Resources Division. During 1994-1995 biennium, support was provided for a workshop on on-farm conservation in South East Asia, and for the preparation of guidelines for the *in situ* conservation of wild relatives of crop plants. A regional workshop on the *in situ* conservation of genetic resources of woody species in semi-arid areas was also supported.

10. *Evaluation/Monitoring of the Use of Plant Genetic Resources for Sustainable Agricultural Development* assists member countries in assessing the genetic variation in their germplasm collections, value and use plant genetic resources for crop improvement, undertake training activities and establish evaluation and monitoring procedures.

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1 The budget share devoted to the servicing of the Commission on Plant Genetic Resources during the biennium reflects the more frequent sessions of the Commission and its Working Group requested under Conference Resolution 7/93 for the negotiation, by countries, of the revision of the International Undertaking on Plant Genetic Resources.

2 Document CPGR-6/95/4 contains a progress report on the Global System, and the information given there on the state of development of the Global Systems is not repeated here. This document considers only Regular Programme support to the operation of components of the Global System.

3 A progress report on the International Network of *Ex Situ* Collections is given in document CPGR-6/95/12.

Table 1: Budget allocations to programme elements with components relevant to plant genetic resources and estimated weight of these components

	1994-1995 Budget (US$ 000)	Estimated weight of PGR components
Ex situ conservation and networking	435	high
In situ protected areas and networking	54	high
Evaluation/monitoring of use of plant genetic resources for sustainable agricultural development	262	high
State of the World's Plant Genetic Resources Report and Global Plant Action	257	high
Development of grain and oil-seed legumes	479	medium
Improvement of cereals and cereal-based production systems	1498	medium
Improvement and intensification of vegetables	351	medium
Promotion of smallholder root and tuber systems	435	medium
Development of fruit production	557	low
Horticultural crops diversification and intensification of mixed cropping systems	427	medium
Major industrial crops and mixed perennial cropping systems	861	low
Industrial crop diversification, illicit drug crops substitution and development of under-utilized plants	243	medium
Promotion of plant biotechnologies	496	high
Improvement of plant breeding methods and their application	105	high
Seed and planting material introduction and exchange	547	medium
Information systems on seed and plant genetic resources	847	high
Strengthening of national seed programmes	1150	low
Improved on-farm seed production	451	medium
Implementation of International Plant Protection Convention	1622	low
Integrated Pest Management	1931	small

11. *State of the World's Plant Genetic Resources* and *Global Plan of Action* provide support for the preparation of the Fourth International Technical Conference on Plant Genetic Resources, in the context of which the first of the periodic reports with these titles will be produced.

12. *Development of Grain and Oilseed Legumes*, like other elements dealing with crop development, contains substantial breeding activities, for example, the enhancement of genetic capacity for biological nitrogen fixation, development of *Ascochyta*-resistant chickpeas and breeding for stress-tolerance in legumes.

13. *Improvement of Cereals and Cereal-based Production Systems* includes new approaches to breeding and hybrid rice development. FAO provides the secretariat for the International Rice Commission, which includes rice germplasm utilization activities.

14. *Improvement and Intensification of Vegetables* concentrates on breeding and promoting vegetable varieties adapted to specific agro-ecological conditions, particularly in the tropics. This is often promoted through networks.

15. *Promotion of Smallholder Root and Tuber Production Systems* focuses on specific research on genetic manipulation of cassava to overcome post-harvest deterioration.

16. *Development of Fruit Production* includes the genetic improvement of planting material.

17. *Horticultural Crops Diversification and Intensification of Mixed Cropping Systems* supports crop diversification as well as a range of crop-related networks, which facilitate the conservation, exchange and utilization of specific crop germplasm.

18. *Major Industrial Crops and Mixed Perennial cropping Systems* has a strong genetic resource utilization component, through the promotion of the production of improved varieties of oil palm, coconut and annual oil-seed crops, the introduction and development of new oil-protein crops, and the development of glandless cotton varieties and stress-tolerant and pest-resistant varieties.

19. *Industrial Crop Diversification, Illicit Drug Crops Substitution and Development of Under-utilized Plants* includes crop introduction and diversification, as well as the promotion of under-utilized species better suited to local conditions and market demand.

20. *Promotion of Plant Biotechnologies* and *Improvement of Plant Breeding Methods and their Application* promote the development of plant genetic resource utilization infrastructures, networking, and the establishment of databases of researchers in tissue culture and recombinant DNA. There is an emphasis on technology transfer for the conservation and utilization of germplasm, particularly the *in vitro* production of vegetatively propagated and recalcitrant-seeded species; the production of virus-free mertistems for germplasm exchange; and training for germplasm collection and conservation.

21. *Seed and Planting Material Introduction and Exchange* and *Information Systems on Seed and Plant Genetic Resources* support the Plant Genetic Resources Information and Seed Exchange Unit, which implements the World Information and Early Warning System,[4] as well as seed exchange activities.

22. *Strengthening of National Seed Programmes* and *Improved On-farm Seed Production* provide assistance to governments in formulating and implementing their national seed policies, and assist smallholders - particularly in poor or remote regions - to adopt appropriate technologies for the

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[4] A progress report on the World Information and Early Warning System is contained in document CPGR-6/95/13.

processing, quality control, storage and distribution of seeds and planting material. By helping farmers produce good quality seeds from their own cultivars, the conservation and continued development of these cultivars is promoted.

23. *Implementation of the International Plant Protection Convention* covers regulatory aspects for the safe international movement of germplasm. This is of high importance as, in many developing countries, the dependence on introduced and improved crops is high. Safe germplasm introduction depends on plant quarantine. The element is developing "Guidelines for the safe movement of germplasm", jointly with IPGRI.

24. *Integrated Pest Management* provides a general framework in which Pest-resistance, bred into plants from a broad genetic base, is an important strategy. IPM also promotes the conservation of genetic diversity at all trophic levels of the cropping system in which it is applied, by mitigating inappropriate pest-driven selection. When pest pressure is high, it can result in important selection pressures that do not occur when IPM suppresses the pest: for example, with high pest pressure, crop damage may increase to a level where farmers discard the variety in question, which results in the loss of many more genes other than those that caused susceptibility to the pest. The problem is particularly acute when a particular farming system has selected for specialized strains, biotypes and races of the pest. IPM has very broad implications for crop genetic resilience, because it makes farmers the direct managers of diversity promotion and conservation processes.

25. The Fifth Session of the Commission, in considering the draft Code of Conduct for Plant Biotechnology, recognized that some of the technical aspects it covered should be incorporated in the **FAO Plant Biotechnology Programme**, and requested to be informed about progress made in the development and implementation of the programme. This information is provided in document CPGR-6/95/15.

26. The **Special Action Programme on the Conservation, Use and Sustainable Development of Plant Genetic Resources** undertakes a major set of activities, the main purpose of which is to build the capacity of FAO Members to effectively conserve and utilize plant genetic resources for sustainable agriculture. The Special Action Programme (SAP) is based on partnership between FAO and national, regional and international organizations, including non-governmental organizations and farming communities, to complement each others activities. Some examples of Regular Programme activities follow.

27. Assistance being provided to Eastern Europe was expanded to the Newly Independent States (NIS) of the Caucasus and Central Asia, as well as to the Baltic countries. Joint FAO/IPGRI expert missions evaluated plant genetic resources activities and the security of existing collections in Azerbaijan, Kazakhstan, Kyrghystan, Turkmenistan and Uzbekistan, and Estonia, Latvia and Lithuania. All these countries are in the initial stages of developing national plant genetic resources programmes. A variety of needs were identified, sometimes for emergency action to secure existing collections.

28. With financial support from the Regular Programme, the Crop Germplasm Institute of China multiplied 2,500 accessions of cereal crops for safety duplication at Qinghai Genebank. A catalogue of these materials was also published, to facilitate international germplasm exchange. Similar support was provided to the Czech Republic, for the multiplication and safety duplication of existing germplasm collection, and for the sharing of samples with the Slovak Republic. Support was provided for a study on mushroom germplasm conservation, and for the establishment of a base collection of *camelia sinensis* (a crop with recalcitrant seeds) in India.

29. During 1994, FAO continued to provide technical support, under the Regular Programme, to develop projects to be implemented with extrabudgetary funds. The projects aim at strengthening regional and national programmes for the conservation and utilization of plant genetic resources.

For example, a project for the "Conservation of Wild Species of *Arachis*" in South America was prepared, with FAO's technical input, and funding from the Common Fund for Commodities (CFC) and the World Bank for a period of 5 years (1995-1999). CENARGEN (Brazil), ICRISAT and CIAT are also involved in the project. Technical support was also provided to develop a project for "Groundnut Germplasm Conservation, Evaluation and Diffusion in West Africa", which is likely to be supported by the same donors. CIRAD (France), ICRISAT and ISRA (Senegal) are also involved in the project. The activities of this five-year project include the production of distribution and genetic diversity maps for various wild *arachis* species, site studies on population dynamics, the development of technical and legal strategies for *in situ* conservation, the establishment of conservation sites and the strengthening of regional and national capacities to sustain activities after the project ends, through training, information dissemination and networking.

30. **Global and regional crop-related networks** were established, between 1992 and 1995, in close collaboration with FAO Regional Offices, and relevant scientific organizations. A description of the individual crop-related networks is given in *Appendix 1*. The innovative aspect of the newly launched networks is the promotion of a coordinated approach to identifying, evaluating and conserving the genetic variability of selected crop species, with the aim of its utilisation for the improvement of cultivars and their adaptation to farmers' needs. The networks combine a thorough knowledge of the agricultural conditions of farmers in network member countries, with an understanding of the genetic potential of the crop species in question, and use a "farmers-to-farmers" basis for the development of conservation and utilisation activities, that is, the collection from farmers of locally adapted germplasm, its improvement, and its return to the same farmers, or farmers in similar biotopes. The work of several of these networks is also guided by an economic intelligence function (an analysis of market factors), which assists farmers to improve quality and suit their production to market requirements.

31. A wide variety of **individual and group training activities** were supported, during 1993 and 1994, in close collaboration with national programmes and international organizations. A list of training courses and workshops organized in 1993 and 1994 is given in *Appendix 2*.

32. In the field of **publications**, FAO continues to support the FAO/IPGRI *Plant Genetic Resources Newsletter*, which is distributed free to over 5,000 addresses in developed and developing countries. For the 1993 World Food Day, *Harvesting Nature's Diversity*, a popular publication designed to raise public awareness of the importance of genetic resources for agriculture, was produced. In the same year, *Development Education Exchange Papers* published an issue reviewing FAO and non-governmental organization programmes and publications on plant genetic resources. Following adoption by the FAO Council, the *International Code of Conduct for Plant Germplasm Collecting and Transfer* was published in 1994. In 1994 and 1995, FAO also jointly supported various publications relevant to plant genetic resources (see *Appendix 3*), and presented various technical papers in international fora.

Field programme activities

33. Crops are the largest sector in FAO's field activities, and in 1993, accounted for 24% (US$ 498,793,000) of the total value (US$ 2,150,000,000) of all ongoing field projects.[5] However, it is difficult to establish what part of this sum is related to plant genetic resources activities. On-going field projects in 1993 and 1994, with plant genetic resources components, are listed in *Appendix 4*.

[5] These figures present the total budget of ongoing projects, which often started many years earlier. In 1993 alone, expenditure on all projects was $ 306,000,000.

34. The Fourth International Technical Conference on Plant Genetic Resources is being prepared, with extra-budgetary resources, through a multi-donor trust fund, GCP/INT/573/MUL, at a cost of US$ 6.6 million, not counting substantial assistance provided by donors outside this budget.[6]

35. Many technical assistance field projects involve plant genetic resource activities, in one way or another. A few projects have plant genetic resources conservation as the main objective. Others may be exclusively concerned with the utilization of plant genetic resources, for example, through biotechnology, plant breeding, and seed production. Many more contain plant genetic resource components of varying importance. With such projects, it is difficult, or impossible, to determine directly the relative part of plant genetic resource conservation and utilization, and even more, to assign budgetary figures. The existence of a plant genetic resources component may be stated or unstated, often as a result of the definitions used during project formulation. The type of activity, and the relative importance of plant genetic resource activities may also change during project implementation. It should also be noted that are many projects (for example, on strengthening agricultural documentation services or for training extension officers) that have no direct genetic resource component, though plant genetic resources are being dealt with.

36. To complement the list of projects in *Appendix 4* and illustrate the range of projects that contain plant genetic resource element, a number of selected projects will be described briefly.

37. The recently completed FAO/UNDP project, VIE/87/005, "Development of Agricultural Genetics for Vietnam", is an example of a project dealing almost exclusively with the utilization of plant genetic resources, though biotechnology and advanced breeding. The project built up a strong national genetic resources capacity to support research on plant breeding. There was also a legal component, which strengthened the institutional capacity to deal with intellectual property and patent rights, plant breeder's rights and international agreements.

38. The long-running FAO/UNDP project in India, IND/85/020, "Advanced Centre on Post-Graduate Agricultural Education and Research" (with a total budget of US$ 12,020,408 over eight years) is an example of a project with many plant genetic resource components. Some training covered plant genetic resources conservation and utilization (seed storage, seed pathology and seed testing). Other components (for example, soil conservation through agroforestry, relate to the indirect utilization of plant genetic resources). The total input for plant genetic resources utilization in 1993 (the project closed in early 1994) is estimated at US$ 40,000.

39. The regional FAO/UNDP FARM project, UNDP/RAS/92/078, "Farm-Centred Agriculture Resource Management Programme", contains three sub-projects relevant to plant genetic resources: RAS/93/066, "Asian Biotechnology and Biodiversity", RAS/93/064,"Agroforestry Network" and RAS/93/065, "Integrated Pest Management". A further sub-programme, RAS/93/067, "People-centred Sustainable Development", aims at developing farmers' capabilities for participation in the improved management, conservation and utilization of natural resources.

40. Sub-project RAS/93/066 includes a specific component on conservation, in addition to an extensive component on utilization, through biotechnology. One of the objectives of the sub-project is the assessment of the potential of new biotechnologies to contribute to the characterization and conservation, by farming communities, of biodiversity. A "rational farming system" will be studied, because of its relevance to natural resources management. Workshops on biodiversity assessment will be held, and there will be extensive networking.

41. Sub-project RAS/93/065 aims to develop national capabilities for training in community-based organization-building for IPM, in lowland and upland farming systems in Asia and to

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[6] A progress report on the preparation of the Fourth International Technical Conference is contained in Document CPGR-6/95/6.

establish community-based field laboratories for IPM research, including for the assessment of new developments in biodiversity and bio-technology.

42. Projects TCP/BUL/2252, "Support to the Plant Genetic Resources Programme" and TCP/CUB/0056, "*In vitro* Conservation" are examples of FAO Technical Cooperation Programme projects. Project TCP/BUL/2252 supplied new equipment to the Bulgarian national genebank, faced with an emergency situation, to prevent the loss of the germplasm collection, prepared a report on the safety of the germplasm, and drafted a project proposal for long-term safety measures. Project TCP/CUB/0056 assisted Cuba to became the second country, after France, to use cryopreservation to conserve shoot-tip sugarcane germplasm.

43. Through project GCP/INT/543/NOR, "Support to Development and Management of Base Collections of Plant Genetic Resources", Norway provided direct support to the establishment of the International Network of *Ex-Situ* Collections under the Auspices of FAO through funding a professional staff position.

44. Project GCP/RLA/108/ITA, "Improved Seed Production: Caricom Countries and Suriname", supported by Italy, covers 14 countries in the Caribbean. Its provides quality seeds and planting materials of major crops to enhance national food security and promote export diversification. The project has a strong training element, and is computerizing data on crop varieties and germplasm collections.

45. The FAO/UNDP project, CHD/91/004, "Assistance à la production de semences en zone sahélienne" supports the collection and evaluation of local varieties of millet, sorghum, cowpea, groundnut and sesame in Chad's Sahelian Zone. Better performing varieties, better adapted to the region's agro-climatic conditions of the region will be introduced through a seed production programme.

46. The FAO/UNDP project, MAU/92/005, "Appui à la vulgarisation de la production de semences traditionnelles de qualité", contributes to safeguarding local germplasm by assisting Mauritanian farmers produce better quality seed of the local varieties until now propagated from traditional farm-saved seed, often of very poor quality. Farmers will be given modern techniques to produce seeds good quality, easily storable seed, and encouraged to create seed security stocks, individually, or at village level, for use if the crop fails.

47. During 1994, the balance of the International Fund on Plant Genetic Resources trust fund was used to support "Andean Seed Fairs" in Peru. These traditional harvest season fairs facilitate the exchange of local crop seeds and traditional knowledge. Community leaders and the peasants competed for seed diversity and knowledge about traditional crop seeds. Winners were recognized as "germplasm conservationists".

2. Activities on forest genetic resources

Regular programme activities

48. *Table 2* lists the major budgetary allocations,[7] within the 1993-94 Regular Programme budget of the Forestry Department, in which substantial forest genetic resources take place.

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[7] Other programme elements not listed here, also have important plant genetic resource activities: these include, for example, activities for wild-life protection and protected areas, such as natural parks.

Table 2: Budget allocations to programme elements with components relevant to forest genetic resources, and estimated weight of these components

	1994-1995 Budget (US$ 000)	Estimated weight of PGR components
Conservation of forest genetic resources	134	Large
Plantation development and seed improvement	407	medium
Support to statutory and advisory bodies sustainable agricultural development*	212	medium

* The Panel of Experts on Forest Genetic Resources, and the International Poplar Commission, which has a very active Working Group on Poplar Breeding.

49. FAO's Regular Programme activities support national and regional bodies in the exploration, collection, exchange, evaluation, utilization and improvement of forest genetic resources, and their conservation, *in situ*[a] and *ex situ*.

50. A study on the effects of deforestation on biological diversity and genetic resources was initiated, as a complement to the FAO's Global Forest Resources Assessment.

51. Over the past two years, National institutes in Bangladesh, Ghana, India, Lebanon, Myanmar, Pakistan and Thailand were contracted to explore and collect forest tree and shrub reproductive materials, for field evaluation in internationally coordinated provenance trials, and for research and conservation purposes.

52. Governments and institutions in 24 countries in four regions cooperate in the activities of the International Neem Network, coordinated by FAO at international level. The coordinated efforts of the Regular Programme and field projects (such as RAS/91/004) were essential in developing the Network. Activities include provenance-level exploration, seed collection and exchange, coordinated field evaluation, and research on phenology, seed physiology and technology, genetic diversity and reproductive biology using genetic markers, and variation in chemical compounds. To refine procedures, pilot seed collection and exchange activities were undertaken in 1993 and 1994. Full-scale provenance collection will take place in 1995, and field trials will be established in 1996. In addition to supporting developing countries, FAO made contractual arrangements with the Commonwealth Scientific and Industrial Research Organization (CSIRO, Australia), the DANIDA Forest Seed Centre (Denmark) and CIRAD-Forêt (France) to assist developing countries, within the framework of the Network.

53. In cooperation with collaborating national institutions and with the assistance of the DANIDA Forest Seed Centre, arid-zone species/provenance trials established in a number of countries within the framework of the FAO Regular Programme coordinated project, "Conservation of Genetic Resources of Arid/Semi-Arid Zone Arboreal Species for the Improvement of Rural Living", were assessed. Regular, national level assessments, by countries over the past years, were complemented by a global assessment, with the aim of increasing knowledge of genetic variation, and variation patterns in the species involved, and of the potential, and adaptability of their provenances to various environmental conditions.

54. National research institutes in Cameroon, Congo, Côte d'Ivoire, as well as CSIRO and CIRAD-Forêt, were contracted to support assessment and synthesis of the results of the network of international

[a] Activities related to *in situ* conservation are reported in document CPGR-6/95/4.

provenance trials of *Eucalyptus urophylla* established in the 1970s, under the coordination of FAO, thus enabling the results of this important network to be synthesized and disseminated for use in tropical countries.

55. FAO participates in the management committee of the European Forest Genetic Resources Programme (EUFORGEN), which IPGRI chairs. EUFORGEN was established in response to resolutions of the Ministerial Conference on Forest Protection in Europe, in Strasbourg (1991) and Helsinki (1993). The Coordinator of EUFORGEN is located at IPGRI. It initiated its activities with four species-based networks: on black poplar, cork oak, Norway spruce, and "noble hardwoods". The Black Poplar Network's first meeting took place in conjunction with a meeting of the Executive Committee of the International Poplar Commission, an FAO statutory body. In the case of cork oak, which is found on both sides of the Mediterranean, FAO provides coordination with relevant activities of the FAO research network on cork oak operated within *Silva Mediterranea* (an FAO Statutory Body).

56. In collaboration with the Petawawa National Forestry Institute (PNFI) of the Canadian Forest Service, a Workshop on Genetic Resources of Forest Tree Species of Boreal Zones is being organized. A Workshop on Genetic Resources of North American Temperate Forest Species is being organized with the Forest Service of United States Department of Agriculture, within the framework of FAO's North American Forestry Commission. Both meetings are planned for June 1995, as an important input to the Ninth Session of the FAO Panel of Experts on Forest Gene Resources, which will meet in October 1995, and the Fourth International Technical Conference on Plant Genetic Resources.

57. Recent Forestry Papers include: "Conservation of genetic resources in tropical forest management - principles and concepts", "*Ex situ* storage of seeds and pollen, and *in vitro* cultures of perennial woody species" and "Biotechnology in forest tree improvement, with special reference to developing countries".

Panel of Experts on forest genetic resources

58. The Eighth Session of the Panel of Experts on Forest Gene Resources, which guides FAO activities in forest genetic resources, met from 28 to 30 June 1993.[9] It made a number of recommendations related to the exploration, collection, testing and evaluation, exchange, conservation *in* and *ex situ*, and use of forest genetic resources (including breeding and the use of new biotechnologies in forest tree improvement). It stressed the need for increased attention to:

i) support and technical assistance to national institutes in the development and execution of forest genetic resources programmes, and to TCDC activities and networking;
ii) the development of methodologies, and pilot activities, for the *in situ* conservation of forest genetic resources, coupled with forest management and the sustainable use of the resources, to meet present and future needs;
iii) the facilitation of contacts and the exchange of information, know-how and genetic materials for testing and conservation; and
iv) international coordination, and awareness-raising, through information prepared for various levels and target audiences. The FAO annual newsletter, "Forest Genetic Resources", was considered especially useful at scientific and technical level.

59. The Panel up-dated its list of priority species by region and activity. This constitutes the only truly global list of forest genetic resources priorities. The Panel prepared a separate list of species that should receive maximum attention in activities supported or coordinated by FAO.

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9 See the Report of the Eighth Session of the FAO Panel of Experts on Forest Gene Resources. Rome, Italy, 28-30 June 1993. FAO, Rome 1994 (57 pp.).

60. As a follow-up to Panel's recommendations, a "Review of *Ex Situ* Conservation Stands of Forest Species and Provenances" was initiated, in collaboration with national institutions, with the support of the DANIDA Forest Seed Centre (Humlebaek, Denmark).

Field programme activities

61. The total delivery costs of FAO's forestry field projects, in the 1992/93 biennium, was US$120,200,000[10]. In its 1993 meeting, the Panel of Experts on Forest Gene Resources reviewed a survey of FAO's 267 on-going forestry field projects, many of which have forest genetic resource components. The projects can be broadly classified into five main categories, as shown below. They are operationally and technically supported by the Forestry Department and, if necessary, by other units of FAO.

Table 3: FAO forestry field projects reviewed by the last session of the FAO Panel of Experts on Forest Gene Resources

Main categories*	Number of projects	% of projects	% of expenditure
Renewable resource conservation and forest management	77	29	35
Fuelwood and community forestry	64	23	33
Forestry institutions	82	30	17
Forest research and technology development	34	14	9
Forest industry and trade	10	4	6
TOTAL	267	100	100

* Most projects cover several categories. The classification is approximative, and based on the criterion that at least 50% of activities related to the category specified.

62. All projects, to a greater or lesser extent, contain elements of biological and genetic conservation. Conversely, most projects concerned primarily with the conservation of biological diversity in forest ecosystems, and forest genetic resources, also contain strong institutional strengthening and training components. In addition to a wide range of national projects, there are a number of important regional and sub-regional projects, such as the FAO/UNDP project, RAS/91/004, "Improved Productivity of Man-Made Forests through Application of Technological Advances in Tree Breeding and Propagation", and the FAO/GEF project, UNO/RAF/006/GEF, "Institutional Support for the Protection of East African Biodiversity".

63. In recent years, a large proportion of forestry field projects have focused, or laid special emphasis on, forest genetic resources and biological diversity in forest ecosystems. All developing regions are covered, with a concentration on the Asia Pacific Region. In line with government priorities, such projects focused largely on seed procurement, tree improvement and research. In Africa and Latin America, the focus was on *in situ* conservation, and the conservation and sustainable use of forests and forest ecosystems. Most projects were in the tropics, or semi-tropics, but there were also a small number of projects in developing countries in the temperate zones. In the tropics, projects were fairly evenly distributed between the dry and humid areas.

[10] US$ 46,400,000 under FAO/UNDP projects, US$ 69,100,000 under Trust fund projects (support costs and Associate Professional Officers excluded), and US$ 4,700,000 under the Technical Cooperation Programme.

Table 4: Number of forest biological diversity/genetic resources projects and their main activities (as of June 1992)

	Africa	Asia and Pacific	Latin America/ Caribbean	Near East/ Europe	Inter-regional	TOTAL
Support to national institutions	7	11	2	3	1	24
Regional coordination	4	5	3	0	1	13
Gathering/exchange of information	7	7	2	3	1	20
Training	5	6	3	4	1	19
Seed collection and production	5	8	2	3	1	19
Testing/breeding	1	6	-	2	1	10
Conservation of FoGR and forest management	6	11	6	5	1	29
Ecosystem conservation	6	5	7	1	-	19

3. Legal activities related to plant genetic resources

64. Under the Major Programme 1.3, Legal, the Legal Office undertakes significant activities in the area of plant genetic resources, especially in connection with the development of the International Network of *Ex Situ* Collections under the Auspices of FAO, the implementation of the Convention on Biodiversity and its implications for the International Undertaking on Plant Genetic Resources, and the development of Codes of Conduct, such as Code of Conduct on Plant Germplasm Collecting and Transfer. The Legal Office also provides direct support to inter-governmental negotiations, such as currently underway, for the revision of the International Undertaking on Plant Genetic Resources.

65. Through the Regular and Field Programmes, FAO continues to provide technical assistance, at regional and national level, in the formulation of policies, strategies and legislation in the field of plant genetic resources and related matters.

66. Since mid-1992, FAO is executing a UNDP-funded project, UNO/RAF/006/GEF, which has provided Kenya, Tanzania and Uganda with institutional support for the protection of East African biodiversity, and, particularly, with advice in the context of the ratification of the Convention on Biological Diversity. Tanzania has greatly benefited from another FAO/UNDP project, URT/93/003, through the enhancement of the capacity to coordinate the national seed programme. The project assisted in the preparation of suitable draft legislation for a plant breeders's rights system.

67. During 1993 and 1994, the FAO Legal Office assisted the Dominican Republic in the drafting of its Seeds Act and accompanying regulations, under the Technical Cooperation Programme project, TCP/DOM/2352, "Análisis y Certificación de Semillas". In 1995, the Legal office is providing similar assistance to El Salvador, under project TCP/ELS/4452, "Apoyo a la Reestructuración del Orgamismo Certificador de Semillas". Project TCP/PAK/4557, "Preparation of a Seeds Sector Development Programme", is assisting Pakistan in the drafting of plant breeders' rights legislation. Malaysia has

requested assistance from the Technical Cooperation Programme in the field of seed certification and legislation, and a project proposal entitled "Strengthening Malaysia's Plant Material Production, Certification and Marketing Programme" is currently being updated.

APPENDIX 1

INTERNATIONAL AND REGIONAL CROP-RELATED NETWORKS SUPPORTED BY FAO

1. The **International Mushroom Germplasm Conservation Network** was established to strengthen international collaboration among specialized institutions, with a view to constituting a coordinated global system of mushroom germplasm collections under the aegis of FAO, and to facilitate technical communication and the exchange of strains of cultivated mushroom, and of germplasm of other mushroom species of interest for food and agriculture. The establishment of a more comprehensive and coordinated information mechanism, which would make mushroom strains, together with appropriate production technologies, available to as many interested countries and growers as possible, is also an aim.

2. The **International Network on Cactus Pear** will carry out a series of activities, including a survey of members' existing cactus genetic resource collections; the preparation of a "Descriptor list for cactus pear" and "Guidelines for improving and facilitating the exchange of cactus material for germplasm collections"; and the establishment of germplasm repositories in various locations. A basic germplasm information system for network members will also be established, following the criteria of the FAO World Information and Early Warning System on Plant Genetic Resources.

3. The **Olive Genetic Variability Network** has recently been established as a working group under the existing ESCORENA (European System of Cooperation Research Networks in Agriculture) Olive Network. The group is undertaking activities related to all aspects of the identification, evaluation, and conservation of olive germplasm, and will assess the value of the world's olive genetic variability available, define priorities for its conservation, describe the facilities available in each country for conserving this germplasm, and elaborate a mechanism for exchanging information through voluntary intercountry collaboration. The working group, which includes national institutions dealing with olives from all over the world, is preparing a world list of olive germplasm, covering both cultivars and wild relatives, and a description of their characteristics.

4. **The Citrus Network** already covers the Americas and the Caribbean, and the Mediterranean. It has developed through two distinct inter-regional networks:

The Inter-American Citrus Network (IACNET), under which a **Citrus Genetic Resources Working Group** was established, closely linked to other groups working on citrus production problems, with the purpose of ensuring the conservation and continued availability of adapted citrus germplasm in the region, for use in plant improvement programmes. The activities of the working group focus on building up and reinforcing disease-free germplasm collections, improving methodologies and training national personnel for the maintenance and exchange of germplasm, and developing an information base to facilitate access to germplasm.

The FAO Inter-Country Collaboration Network on Citrus Improvement for the Wider Mediterranean Region, under ESCORENA, has a **Sub-Network for Citrus Germplasm Collection, Conservation, Evaluation and Exchange**, the ongoing activities of which include establishing an exhaustive list of varieties and rootstocks in the whole Mediterranean area; checking genetic identification through relevant techniques (such as taxonomy, or the use of molecular markers); establishing a data bank (with the use of appropriate software) for interactive exchange; identifying institutions and locations for the long-term conservation of citrus germplasm, both in field collections and by new biotechnological means (such as *in vitro*

conservation and cryopreservation); and the definition of core collections of both commercial varieties and of germplasm resources with potential for use in plant improvement and breeding.

5. This networking activity will be expanded to Africa and Asia as well, in order to develop a fully global approach to coordinated citrus germplasm conservation and utilisation.

6. The Inter-regional Cooperative Network on Nuts (under ESCORENA) with its transversal **Working Group on Tree Nut Genetic Resources Identification, Evaluation and Conservation** assists its member countries in further developing a comprehensive programme of nut germplasm conservation, and interacts actively with their nut production sectors, in order to better guide a common and coordinated programme of nut genetic resource utilisation. The transversal working group is concentrating on preparation of nut germplasm catalogues, initially for walnut, almond and pistachio and subsequently for hazelnut, pecan, pinenut and chestnut.

7. The Mediterranean Fruit Inter-country Network (MESFIN), with its **Sub-network on Plant Genetic Resources Conservation**, was established under ESCORENA, with the aim of promoting the identification, evaluation and conservation of the existing genetic diversity of tropical and subtropical fruit species cultivated in the Mediterranean region, in order to make it available for utilisation in improvement programmes to increase and improve fruit production. Ongoing activities include identification of the native, old and new genetic variability existing in the region suitable for conservation; evaluation, on the basis of a set of main identified criteria (disease-resistances, abiotic stress resistance, fruit characteristics, and productivity potential); definition of long, medium, and short-term conservation methodologies (seed, field, *in vitro*, and cryopreservation); the exchange of information and planting materials among participating institutions; and specialized training courses on conservation and evaluation. The network collaborates closely with the Under-utilized Tropical Fruit Trees Network in Asia (UFTANET), in order to develop global-scale activities for the conservation of tropical fruit germplasm.

8. Efforts are underway to establish a **Network of Traditional Crops for Southern African Countries**. The network will seek to establish the state of indigenous under-utilized cereals and pseudocereals, grain legumes, vegetables, and root and tuber crops in the region; recommend priority species for exploration, collection, conservation, evaluation and utilization. During 1995, Workshops will be convened to formalize the network.

9. FAO supports and collaborates with the **West Asia and North Africa Network (WANA)**, in order to identify common problems, and factors hampering the effective conservation and utilization of plant genetic resources in individual countries, and to formulate a strategy, and prioritize collaborative research work, for collecting, conserving, evaluating, documenting and exchanging germplasm. IPGRI and ICARDA are also involved.

10. FAO cooperates with IICA and IPGRI and national programmes in the following networks in central and south America and the Caribbean:

The Andean Network on Plant Genetic Resources (REDARFIT) groups the national agricultural research institutes and universities of Latin America and the Caribbean. It promotes the exchange of information on traditional food crops and plant genetic resources, stimulates joint activities, organizes workshops and courses on specific subjects, and supports professional training. The main activity of FAO is the organisation of Regional Cultivar Trials, which stimulates the exchange of germplasm and breeding material among national programmes.

The Amazonian Network on Plant Genetic Resources (TROPIGEN), the activities of which include the characterization, and promotion of the sustainable use, of under-exploited vegetable and fruit crops of regional importance. A list of 46 species of Amazonian food crops has been agreed. The network seeks to concentrate activities in places with a comparative advantage. The

FAO Regional Office for Latin America and the Caribbean (RLAC) provides technical support, and promotes the exchange of crop genetic resources. RLAC also supports the Technical Cooperation Network on Biotechnology (REDBIO), which includes several research projects for the conservation and utilization of genetic resources.

The Central American Network on Plant Genetic Resources (REMERFI), which aims at strengthening national capacities for plant genetic resource conservation, through regional cooperative activities. The network sets priorities for crops and activities of importance for the conservation of the region's plant genetic resources, and is formulating projects for the consideration of donors.

APPENDIX 2

TRAINING COURSES AND WORKSHOPS ON CROP GENETIC RESOURCES SUPPORTED BY FAO IN 1993 AND 1994

FAO/IBPGR (IPGRI), International Workshop on *Ex-Situ* Germplasm Conservation, 7-9 October 1993, Prague, Czech Republic: 21 participants from 12 Eastern European countries.

FAO/IPGRI/National Agricultural Research Centres, National Workshop on Plant Genetic Resources, 5-9 April 1993, Naphok, Laos: 30 participants from Laos.

FAO/IPGRI/National Committee for Genetic Resources, On-farm Conservation in South Asia, 6-8 December 1993, Bogor, Indonesia; 25 participants from 7 South Asian countries.

FAO/IPGRI/Naturindo, The Evaluation of the Present State of *Ex Situ* Conservation of Indonesian Germplasm and On-farm Conservation, 29-31 March 1994, Bogor, Indonesia: 40 participants from Indonesia.

FAO/IPGRI/ICARDA, Advanced Training Course in Plant Genetic Resources, 2-12 May 1994, Aleppo, Syria: 10 participants from 10 West Asian and North African countries.

FAO/IPGRI/IITA, Plant Genetic Resources Collection, Management and Utilization, Ibadan, Nigeria, 24 October-11 November 1994: 18 participants from 10 African countries.

FAO/ICUC/Commonwealth Science Council, International Course on Under-utilized Tropical PGR, 14 November - 1 December 1994, Serdang, Malaysia: 17 participants from 8 Asian countries.

Abbreviations used:

IBPGR	International Board for Plant Genetic Resources (now IPGRI)
ICARDA	International Centre for Agricultural Research in the Dry Areas
ICUC	International Centre for Under-utilized Crops
IITA	International Institute of Tropical Agriculture
IPGRI	International Plant Genetic Resources Institute

APPENDIX 3

PUBLICATIONS RELATED TO CROP GENETIC RESOURCES JOINTLY SUPPORTED WITH OTHER ORGANIZATIONS, 1993-1995

Genebank Standards, FAO/IPGRI, 1994

A Catalogue of Chinese Cereal Crop Germplasm for International Exchange, Institute of Germplasm Resources, Chinese Academy of Agricultural Sciences, Beijing, 1994.

II Reunión Preparatoria para la Creación de la Red Mesoamericana de Recursos Fitogenéticos, CATIE/FAO/IPGRI/IICA, Turrialba, 1993.

Proceedings of the FAO Expert Meeting to Promote Intercountry Cooperation on Citrus Production Improvement in Mediterranean Countries, University of Cukirova/Ministry of Agriculture and Rural Affairs, Adana, 1994.

Proceeding of First National Workshop on Plant Genetic Resources, Ministry of Agriculture and Forestry, FAO, IBPGR, Vientiane, 1993.

Proceeding of the First Meeting of the Working Group: Tropical Fruit Collection Network for the Mediterranean, Agricultural Research Institute/FAO, Nicosia, 1994.

Proceeding of a joint FAO/IPGRI Workshop on *Ex-Situ* Germplasm Conservation, (7-9 October 1993, Prague, Czech Republic), IPGRI, 1994.

Neglected Crops: Another Perspective on 1492: Mesoamerican Plant Genetic Resources, FAO, 1995.

Abbreviations used:

CATIE	Centro Agronómico Tropical de Investigación y Enseñanza
IICA	Instituto Interamericano de Cooperación para la Agricultura
IPGRI	International Plant Genetic Resources Institute

APPENDIX 4

FIELD PROGRAMME ACTIVITIES IN 1993-1994 WITH A CROP GENETIC RESOURCES COMPONENT[1]

PROJECT CODE AND DATES	PROJECT TITLE	COST (US$)	PGR ELEMENT
GCP/BGD/025/BEL 08.89-06.95	Strengthening of national vegetable seed production	1,198,948	Medium
GCP/BGD/028/DEN 01.94-12.95	Strengthening of national vegetable seed production	900,000	Medium
TCP/BUL/2252/A 12.92-12.94	Support to the plant genetic resources programme	48,000	Large
UNDP/CHD/91/004 07.91-12.94	Assistance à la production de semences en zone sahélienne	2,819,919	Large
UNDP/CHD/92/007 01.94-12.95	Assistance à la multiplication de semences en zone sahélienne	623,864	Small
UNDP/CHD/93/CO1 01.94-12.96	Appui à la multiplication de semences en zone sahélienne	1,328,118	Small
UNDP/CPR/91/130 03.93-12.97	Seed breeding programme	230,881	Large
TCP/CUB/2354/A 04.93-03.95	Producción de semilla de soya	125,000	Small
TCP/CUB/2359/A 12.93-12.94	Conservación *in vitro* de germoplasma de hortalizas, raíces y tubérculos	80,000	Large
UNDP/CYP/88/002 04.88-12.94	Plant genetic resources and plant protection	237,827	Large
UNDP/DRK/86/002 05.88-12.93	Vegetable research and development	618,462	Medium
TCP/EGY/2353/A 06.93-12.94	Development of non-traditional horticultural crops	175,000	Medium
TCP/EGY/2354/A 06.93-05.95	Improvement of artichoke development	204,500	Medium
TCP/ETH/2360/1 10.93-03.94	Seed security reserve stock feasibility study	73,000	Small
UNDP/ETH/001 01.88-12.95	Institute of Agricultural Research (Phase VI)	2.737,823	Small

[1] In this list of projects, the concept of utilization is in line with that used by the Commission, and the International Undertaking, which includes, *inter alia*, "plant breeding" and "seed multiplication and distribution" (Articles 6 and 7).

PROJECT CODE AND DATES	PROJECT TITLE	COST (US$)	PGR ELEMENT
UTF/GAB/008/GAB 02.93-12.96	Renforcement de la liaison recherche-développement pour la production horticole/agricole	2,070,480	Small
FFHC/IND/181/BFW 04.91-12/94	National Network of Genetic Resources Conservation Centres and Community Seed Banks	283,550	Large
UNDP/IND/85/020 07.86-03.94	Advanced Centre of Post-Graduate Agricultural Education and Research	12,020,408	Small
UNDP/IND/87/017 12.87-09.94	Plant improvement using modern biotechnology	1,163,450	Large
UNDP/IND/90/007 07.90-06.95	Phytotron facility at IARI (Indian Agricultural Research Institute)	2,216,221	Medium
UNDP/IND/91/008 04.91-12.96	Development and use of hybrid rice technology	1,534,650	Large
UNDP/IND/93/018 04.94-03.99	Development and strengthening of integrated pest management (IPM)	1,802,000	Small
UNDP/INS/93/018 10.94-03.97	Soybean seed production and development	511,825	Medium
UTF/INS/072/INS 04.94-03.99	Integrated pest management (IPM) training	6,409,238	Small
GCP/INT/543/NOR 03.93-03.95	Support to project development and management of base collections for plant genetic resources	307,065	Large
UNDP/KEN/86/029 11.88-12.93	Horticulture crop production and development	1,046,337	Medium
UNDP/KEN/89/015 04.90-02-95	Dryland farming research and development	814,324	Small
UNDP/LEB/91/002 05.93-06.95	Amélioration et développement de l'oléiculture au sud Liban	585,400	Small
UNDP/MAG/87/001 03.89-12.94	Promotion des cultures oléagineuses	2,380,541	Medium
TCP/NIR/2252/A 08.92-08.94	Pilot programme for ginger seed micropropagation and storage	205,000	Medium
TCP/MAL/4451/A 08.94-09.94	Assistance in strengthening rice research study	50,000	Small
UNDP/MAU/92/005 01.93-12.96	Appui à la vulgarisation de la production de semences traditionnelles de qualité	703,820	Small
UNDP/MAU/92/007 10.92-10.96	Production de semences de base de variétés améliorées	673,703	Small
UNDP/MYA/86/018 11.90-12.94	Applied research for plantation crops	1,094,521	Medium
GCP/NEP/043/SW1 07.87-06.95	Fresh vegetable and vegetable seed production (Phase IV)	5,559,235	Medium

PROJECT CODE AND DATES	PROJECT TITLE	COST (US$)	PGR ELEMENT
UNDP/OMA/88/006 12.88-01.93	Date palm improvement	803,921	Medium
UNDP/PAK/89/014 03.91-12.96	Fruit development in baluchistan (Phase III)	3,404,375	Medium
TCP/PAR/4451/A 07.94-06.95	Producción de semillas de algodón	105,000	Small
UNDP/RAB/88/024 01.89-12.94	Control of Bayoud disease of date palm (Phase II)	1,321,025	Medium
UNDP/RAB/88/025 12.92-08.96	Control of virus and virus-like diseases of fruit crops (Phase II)	1,354,361	Small
UNO/RAF/006/GEF 08.92-08.96	Institutional support for the protection of biodiversity	10,000,000	Medium
GCP/RAF/253/CEA	Ressources phytogénétiques des cultures vivrières de l'Afrique de l'Ouest	70,000	Large
GCP/RAS/145/NET GCP/RAS/146/AUL GCP/RAS/147/SWI 01.94-12.97	Intercountry programme for the development and application of integrated pest control (IPM)	17,425,673	Small
UNDP/RAS/89/040 01.90-12.95	Regional cooperative programme for improvement of food legumes and coarse grains in Asia.	2,438,407	Medium
UNDP/RAS/89/036 02.91-12.94	Strengthening jute and kenaf seed programmes	235,429	Medium
UNDP/RAS/89/041 04.91-12.94	Research and development of vegetable crops	689,000	Medium
UNDP/RAS/93/065 10.93-12.98	Integrated pest management (IPM)	993,000	Small
UNDP/RAS/93/066 10.93-12.97	Biotechnology and biodiversity	1,633,000	Large
GCP/RLA/108/ITA 07.92-12.94	Improved seed production: CARICOM countries	1,498,380	Medium
UNDP/ROK/87/018 07.88-03.94	Support to microbial cell bank: Korean Collection for Type Cultures	239,728	Large
TCP/ROM/2351/A 01.94-12.95	Multiplication des espèces fruitières	175,000	Small
UNDP/SAM/92/002 03.92-03-95	Fruit tree development (Phase II)	792,768	Small
TCP/SEY/2252/T 02.89-12.95	Improved vegetable production	250,000	Medium
GCP/SUD/025/NET 11.79-10.95	Development and application of Integrated pest management (IPM) to vegetables, wheat and cotton	7,492.514	Small

PROJECT CODE AND DATES	PROJECT TITLE	COST (US$)	PGR ELEMENT
UNDP/SWA/91/003 01.92-12.93	Assistance to the Swazi seed industry	310,193	Small
UNDP/SYR/92/016 11.94-10.97	Improved olive oil production and processing	286,000	Small
UNDP/TUR/93/001 01.94-06.95	Establishment of a National Network for Integrated Pest Management (IPM)	67,000	Small
UTF/TUR/003/TUR 01.84-12.94	Agricultural extension and applied research	10,000,000	Small
TCP/URU/2354/A 01.94-12.94	Prospección de cultivos alternativos	175,000	Small
UNDP/ZAI/92/001 04.92-12.96	Renforcement du Programme National Riz	5,122,897	Small
UNDP/ZAI/92/002 01.93-12.95	Assistance à la production semencière	1,479,593	Small